AMRAD NEWSLETTER

Amateur Radio Research and Development Corporation
September 1980

OUR SEPTEMBER MEETING WILL BE ON TUESDAY the 2nd because the first Monday is a holiday. The speaker will be Perry Crabill, W3HQX who is a data communications specialist with the Chesapeake and Potomac Telephone Company. Perry's topic will be data communications over the Bell System. The meeting will run from 7:30 to 9:00 p.m. in the Patrick Henry Library, 101 Maple Ave E, Vienna, Virginia. Guests and visitors are welcome.

WE HAD AN UNUSUAL MEETING in August. It was used to describe and demonstrate the equipment and software designed by AMRAD members for deaf communications. Paul Rinaldo, W4RI led off by giving some background of the project which is being done under a grant from the U.S. Department of Education, Office of Special Education. The object of the project is develop interfaces between personal computers and deaf TTY's. Bob Bruninga, WB4APR, project technical director, described the HEX (Handicapped Education Exchange) system which is a unique computer message system designed to accept either 110/300-baud ASCII Bell 103 callers or those using 60-wpm Baudot teletypewriters and Weitbrecht modems - the type used by the deaf. Terry Fox, WB4JFI did a show & tell of his two interfaces that permit a Radio Shack TRS-80 computer to talk to deaf TTY's or TDD's (Telecommunication Devices for the Deaf). A similar interface for the Apple II computer was shown by Nan Sanders and her husband Sandy, WB5MMB. We were very pleased to have several prominent deaf people join us at the meeting and fill out membership applications for AMRAD.

A DEAF COMMUNICATIONS SIG (special interest group) was formed as a result of an informal session at the Pizza Hut after the regular meeting. The idea was proposed by new members Barry Strassler (TTY 301-772-1565) and Steve Brenner (TTY 301-762-4845). The SIG is to have both deaf and hearing members. If you are interested in getting involved in this group, please contact either Barry or Steve via TTY.

A TERRESTRIAL LINEAR TRANSPONDER has been talked about as a joint AMSAT/AMRAD experimental project. The idea is to build a 70 cm-to-2 meter translator for the ground to simulate the OSCAR Phase III satellite. The location for the translator could be the new AMSAT headquarters in Maryland. A possible feature of the translator would be a built-in delay on the data channel to be used for testing packet radio protocols. The project can be as simple or as sophisticated as the participants want. Also, people of different skills are needed to do the various jobs to make it happen. If interested, call Paul Rinaldo, W4RI, 703-356-8918.

THE ARRL BLIND AND PHYSICALLY HANDICAPPED program provides sources of study materials in braille, cassette and flexible disc (audio, not computer floppy disc). An "Index of Information for the Blind and Physically Handicapped" is a 9-page package available for the asking from the ARRL Clubs & Training Dept., 225 Main St., Newington, CT 06111. You'll also find enclosed a pamphlet: "The Courage HANDI-HAM System".
Special devices are often required by individuals with severe physical handicaps or debilitating diseases to enable them to operate radio equipment. An example is the "Puff n' sip" keyer which allows individuals with limited use of their hands to send CW.
The Courage HANDI-HAM System, 3915 Golden Valley Rd, Golden Valley, MN 55422 is a national organization of affiliated clubs and members who specialize in helping handicapped individuals with amateur radio interests. Services include educational materials, amateur equipment loans, special devices aiding in station operation, and most important, fraternity and personal contact. Thanks ARRL *Radio Club News*.

TELETYPE CORPORATION PLANS TO DISCONTINUE manufacture of their Model 28, 32, 33, 35, DRPE, BRPE and 4210 equipment by year-end 1981 due to low demand and the need to reallocate resources to newer products. Parts support and documentation will be continued for five years from the cut off.

A VOLUNTEER IS NEEDED FOR NEWSLETTER ADS

in order to offset printing costs. We had a well qualified individual lined up, but that fell through due to press of other business. The job consists of talking with local potential advertisers and corresponding with others outside the area. If you can take on this part-time job to help the club, please contact Paul Rinaldo, 703-356-8918.

TRANSFER BETWEEN 8-in CP/M AND NORTHSTAR

CP/M can now be done by Terry Fox, WB4JFI, 703-356-8334. Similarly, Dick Barth, W3HWN, has written a program to transfer between Ward Christensen's (CP/M) modem transfer program and a 6800 computer. For more info, contact Dick on 301-681-7372.

CORRESPONDENCE:

1980 July 15

Mr. Adkins-
Enclosed is $12 to cover dues for AMRAD.
Have recently purchased an Apple II computer and am interested in information, programs, RFI info, etc. pertaining to its operation with HF gear.

Thank you,
Dan Berry, N6ARQ
San Ramon, CA 94583

1980 August 10

Dear Paul,
Good information on Computer Oriented SSB nets in last issue!
...would be interested in assembly language software for computer modem terminal system for 6800, auto telco answer etc...
You might contact K6AEP Clay Abrams for interesting info to publish on his use of ASCII baud rate tests between Calif and Australia. He mailed me a graph showing that 110 baud not the best but due to TRS-80 users might become a standard.

Yours,
Edward N. Zibulka, W8AWK
Cincinnati, OH 45243

(Ed. Note: Try W3HWN for the 6800 modem info. Thanks, I've written to K6AEP.)

1980 July 25

Gentlemen,
I know that in AMRAD News Letter appeared many articles regarding data transmissions over the airwaves i.e., computer communication via amateur radio, could you please send me a copy of them.
Is it possible to have a copy of the protocol used in computer to computer transmission as well? I am refering to CBBS that has been developed by Ward Christensen and Randy Suess of the Chicago Area Computer Hobbyist Exchange. Thanking you in advance, I remain,

Sincerely Yours,
Luciano Leperdi
Turin, Italy

(Ed. Note: For CBBS protocol write Ward at 688 E 154th St #3D, Dolton, IL USA 60419. Incidentally, we are pleased to accept membership applications from overseas amateurs. and correspond with them as well as help them find things in the U.S.)

1980 July 25

Dear Gerald,
... The computer I use is OSI Challenger C4Pmf, and I am very happy for any information and contact I can get from you. Here in Switzerland and especially in our local club the mini or home computer is a new field that we begin only now to study. Therefore we are very happy to exchange experiences.

Yours with 73
Dr Ury Erez, HB9PMK
Lugano, Switzerland

(Ed. Note: See Ury's QSL card below.)

HB 9 PMK

Dear Paul,
...want to build your own? (modem). No problem thanks to EXAR. They have some AP-NOTES with complete schematics of both 103 and 202 style modems using their fantastic XR-2211 phase lock loop demodulator and XR-2206 sine wave function generator. I have experimented and found them to work very well in modem applications.
Higher speeds: Since the FCC's rules state that we can use 1200 baud maximum on 2 meters you may conclude that the Bell 201 2400 bps modem could not be used. You must keep in mind that baud and bits per second are not the same. The 201 uses 4 level PSK modulation on an 1800 Hz carrier to transmit 2 bits per baud! The actual rate is 1200 baud with a data rate of 2400 bits per second. That sounds legal to me.

73's
Dale Heatherington WA4DSY

THOUSANDS OF COMPUTERS ARE GATHERING IN WASHINGTON.

The biggest and best computer show ever to be in the Washington/Baltimore area is ready to take place. Make sure you take it in.

Over $50 million worth of software and hardware for business, government, home and personal use will be featured at the new Mid-Atlantic Computer Show in September. Computers from $150 to $250,000, mini and micro computers, data- and word-processing equipment, tele- communications, office machines, periph- eral equipment and services will all be on display and for sale right on the spot.

All the major names like IBM, Xerox, Radio Shack and Apple will be there. There will be conferences on business uses of small to medium sized computers, and how to make purchasing evaluations.

Plus, robots, computerized video games, computer art and computer music will enter- tain and educate kids, spouses and people who don't know a program from a memory disk. It's going to be a great show for everyone. Admission for adults is only $5. The public is invited, and no pre-registration is necessary.

Don't miss the coming of the computers. Show up for the show.

WASHINGTON, D.C.
D.C. ARMORY/STARPLEX, THURSDAY-SUNDAY, SEPTEMBER 18-21
11 A.M. TO 9 P.M. THURS.-SAT., 11 A.M. TO 5 P.M. SUN.

THE MID-ATLANTIC COMPUTER SHOW

Produced by National Computer Shows, 824 Boylston Street, Chestnut Hill, MA 02167, Telephone (617) 739-2000.

Microcomputers in Amateur Radio

Joe Kasser G3ZCZ
11532 Stewart Lane
Silver Spring, MD 20904

Interfacing an S-100 bus computer to an amateur radio station is now almost child's play, thanks to a set of cards manufactured by Snow Micro Systems, Inc., of Silver Spring, MD. They have a set of cards as follows:

AR-1 RTTY INTERFACE CARD

This card contains a serial port using a 8251 Universal Synchronous/Asynchronous Receiver/Transmitter (USART). It can thus be switched from ASCII to Baudot in software. It also contains a crystal-controlled software programmable baud-rate generator for 45.5, 50, 75 and 110 words per minute. The serial interface is at RS-232 levels. This card can drive a Teletype Corp. Model 15, 28, 33, 35 or 37 printer or interface to an existing ST-5 or ST-6 RTTY terminal unit (modem). For those who do not have RTTY equipment but have an S-100 machine, the AR-1 card has an ST-5 (terminal unit) and an AK-2 (audio-frequency-shift keying (AFSK) generator) built on the card. The modem hand-shake signals are used to perform the Morse code identification (CW-ID) function and to provide a *signal presence* to the computer. This signal-detect feature is also usable as a CW detector for Morse code programs. A block diagram of the card is shown in Fig. 1.

SC.01 STATION CONTROLLER CARD

This card was designed for process control applications. It contains six reed relays for transmitter and antenna control purposes, a seven-channel input analog-to-digital converter for reading antenna position or signal level information back into the computer and a hardware time-of-day clock based on a 5318 integrated circuit. The clock circuit uses a 3.5-MHz color TV crystal and has provision for battery back-up, so that the clock keeps running when the computer is powered down. A block diagram of the card is shown in Fig. 2.

TM.01 TRUMP CARD

This card was originally designed for use in the AMSAT Phase III Satellite Telemetry Tracking and Command Network. It is a very versatile card and is useful in the ordinary amateur radio/computer station. It contains two programmable parallel input/output (I/O) ports whose outputs are pin compatible with the SSM-IO-4 board, a serial port using an 8251 USART (i.e., Baudot or ASCII), an 8253 programmable counter/timer driving the USART and the interrupt generator circuitry. An audio tone generator, also present on the card, is available for use as a CW monitor or regular *bell* character. A block diagram of the Trump Card is shown in Fig. 3.

COMMENTS - POSITIVE

The design of the cards was well thought out. The use of the modem handshake circuits on the AR-1 for CW-ID and signal detect is a good idea. The 16-pin DIP connector interface between the analog and digital sections of the card increases its utility. It can be used to interface an existing RTTY station or printer to the computer or as a stand-alone complete system. The ST-5 terminal unit, however, is not optimum for HF usage but will provide good copy on many signals. It works fine on the commercial frequencies too. The traditional scope tuning pickup points are also brought to the 16-pin connector. Note that all wires interfacing the card should be shielded, else they make great antennas for spreading computer-generated radio-frequency interference (RFI) into the shack.

The SC.01 card has provision for a number of different kinds of relays, including 6-volt commercial-grade high current or low current as well as 5-volt DIP packaged ones. The analog-to-digital conversion is performed by a 3½-digit voltmeter integrated circuit.

The TM.01 card is very flexible. The USART can be connected up for internal or external (to the card) clock signals. The interface is at TTL levels. The interrupt generator circuit can be set to provide periodic interrupts or as required by the USART. The tone oscillator is versatile at one of two tones (400 or 800 Hz). The parallel ports are nice for driving a frequency synthesizer or other similar equipment.

COMMENTS - NEGATIVE

In terms of hardware, the use of 88-mH toroids on the AR-1 card means that the card requires two slots in the bus for proper clearance. However, because the toroids are on the edge of the card away from the mother board contacts, the second slot could be filled up by a short card such as a terminator card. The TM.01 trump card design is a little flaky, and the card is prone to high-speed *glitches*. The address decoding is performed using, amongst other IC's, an 82S23 PROM and a 74L42 decoder. Snow recommends the L series device to minimize these glitches. In most systems (maybe not all) it requires deglitch capacitors. In

spite of that, it is a good card.

In terms of pricing the kit price is excessive, considering that the kit is a bare board package and parts. The individual parts can be obtained from advertizers in the magazines for less than the list price of the kit.

The cards are designed for group constuction projects or knowledgeable individuals. As such, the bare boards come with parts lists, schematics, layout drawings and software listings, as applicable. Kits seem to be a bare board package and parts. The assembled and tested cards come with the same documentation and a 90-day warranty. The cards are available from distributors or by mail from Snow Micro Systems, Inc., PO Box 1704, Silver Spring, MD 20902. Bare cards are $45.00 (except the Trump Card which is $65.00). Snow states that bare cards purchased by mail order can be returned for instant refund if the buyer decides that he or she cannot construct the card from the package supplied, providing that no parts have been soldered to the card.

SUMMARY

These S-100 cards are ideal for use in an amateur radio station. Using these cards and a mixture of the software developed by Snow and homebrew, new vistas in automatic and semi-automatic station operation open up. With the corresponding software, OSCAR's can be tracked, RTTY can be automated, and in general hamming becomes more fun.
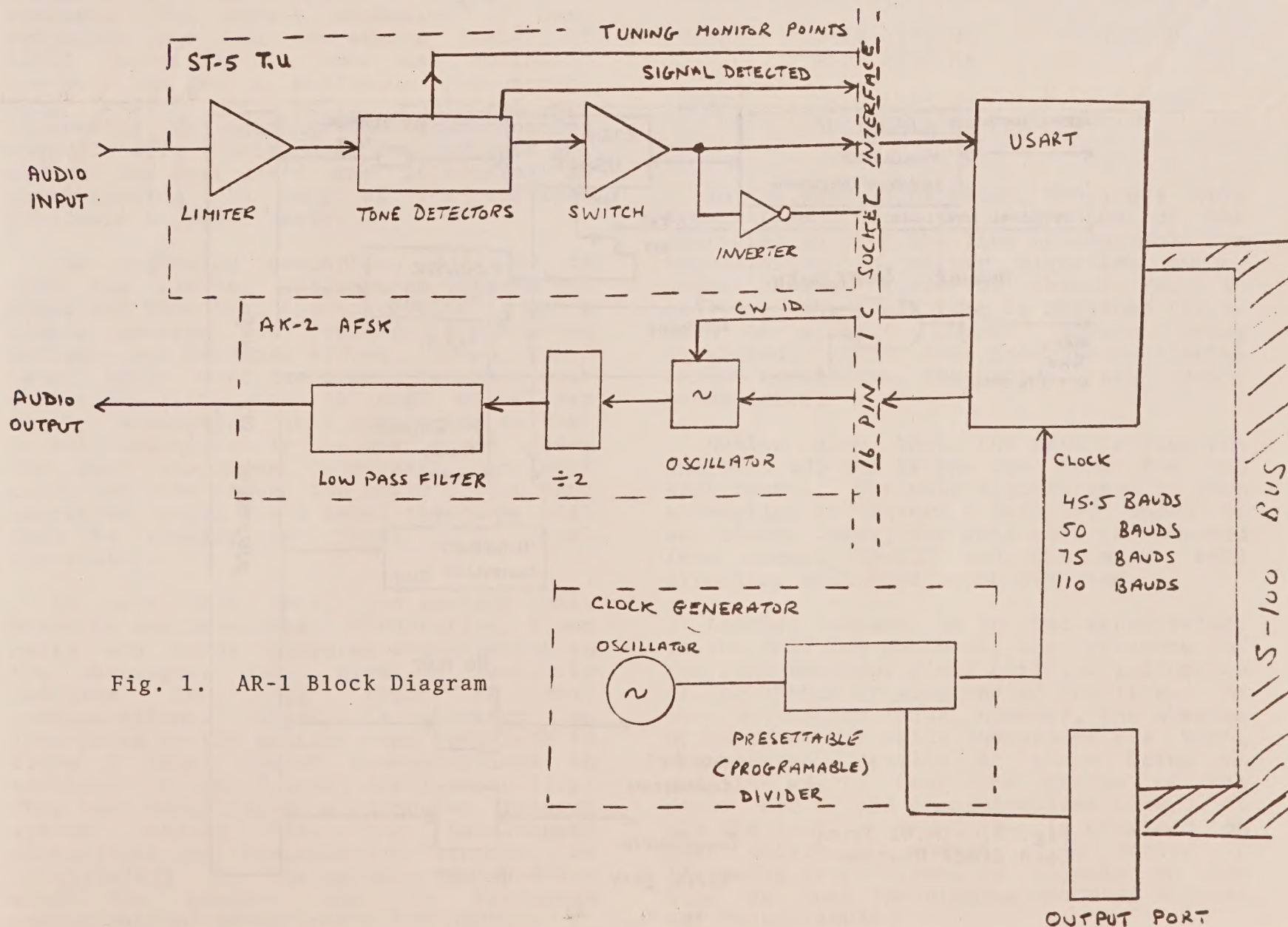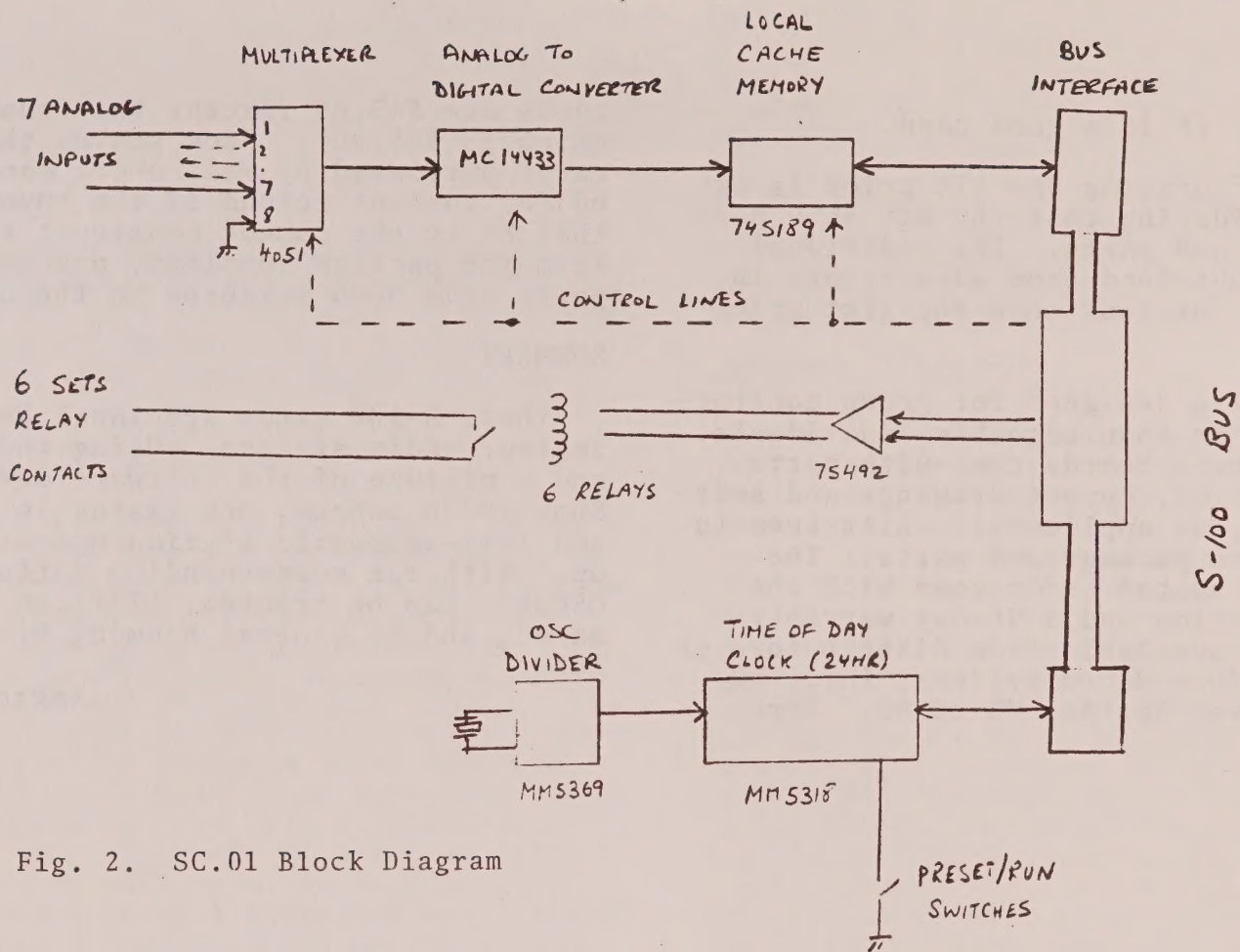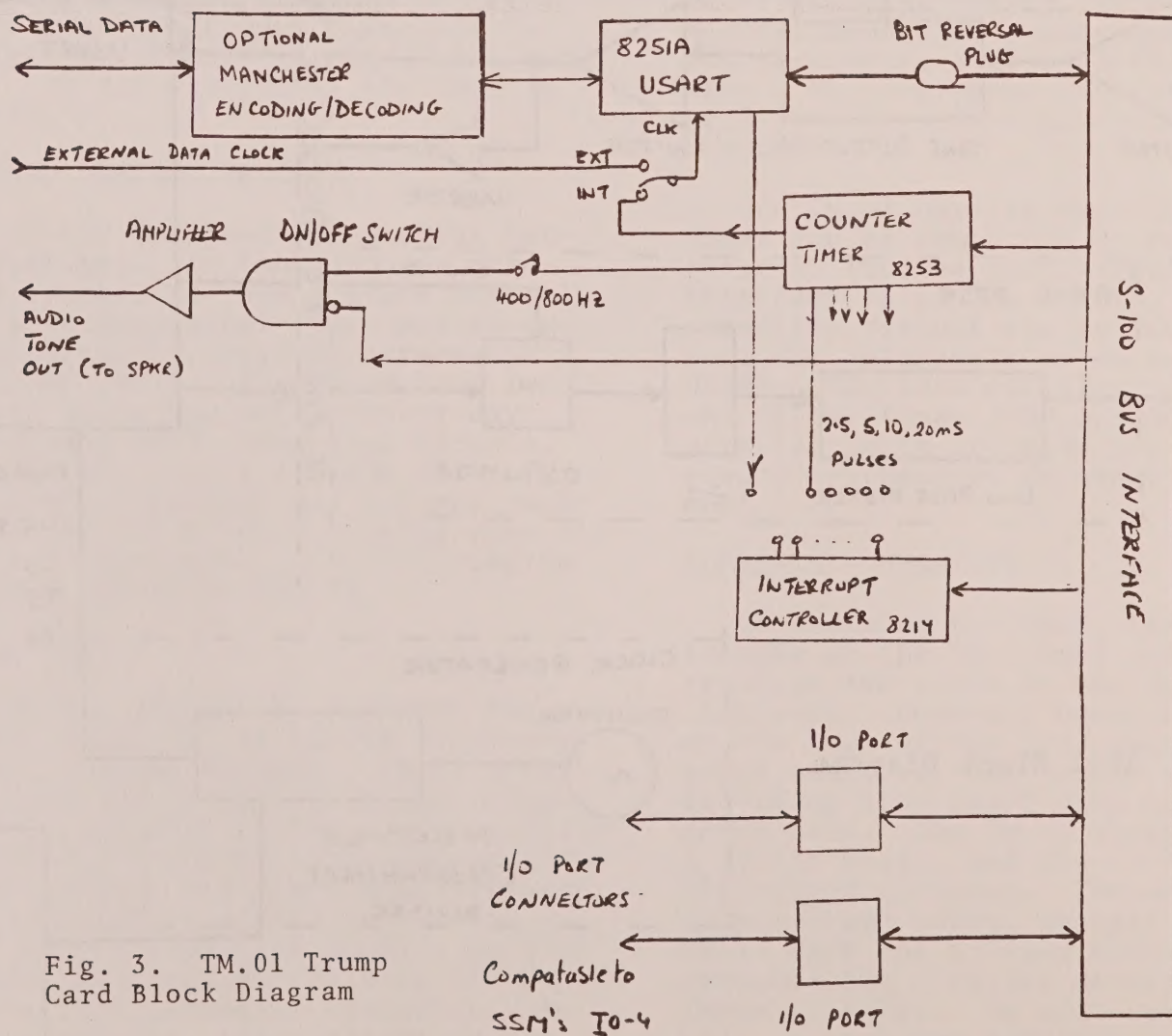
AMRAD Newsletter

Fig. 1. AR-1 Block Diagram

MULTIPLEXER
ANALOG TO DIGITAL CONVERTER
LOCAL CACHE MEMORY
BUS INTERFACE

7 ANALOG INPUTS

1
2
.
7
8

4051

MC 14433

74S189

CONTROL LINES

6 SETS RELAY CONTACTS

6 RELAYS

75492

S-100 BUS

OSC DIVIDER

TIME OF DAY CLOCK (24HR)

MMS369

MM5318

PRESET/RUN SWITCHES

Fig. 2.   SC.01 Block Diagram

SERIAL DATA

OPTIONAL MANCHESTER ENCODING/DECODING

8251A USART

BIT REVERSAL PLUG

EXTERNAL DATA CLOCK

EXT
INT

CLK

COUNTER TIMER 8253

AMPLIFIER   ON/OFF SWITCH

400/800 HZ

AUDIO TONE OUT (TO SPKR)

2.5, 5, 10, 20 mS PULSES

S-100 BUS INTERFACE

INTERRUPT CONTROLLER 8214

I/O PORT

I/O PORT CONNECTORS

Compatable to SSM's IO-4

I/O PORT

Fig. 3.   TM.01 Trump
Card Block Diagram

TELECOMMUNICATIONS DEVICES FOR THE DEAF

Robert E. Bruninga
USS Blueridge LCC-19
Fleet Post Office
San Francisco, Ca. 96628

There are over 3000 Telecommunication Devices for the Deaf in use in the greater Washington D.C. area and estimates range as high as 55,000 nationally. The deaf have been using these devices very successfullly for over fifteen years to communicate among themselves and more recently with a growing number of services which have provided TTY numbers to allow telephone access to deaf users. Although historically the majority of devices were surplus Teletypewriters donated by the Telephone Company and the Military, these mechanical printers are rapidly being replaced by more modern devices offering special features as well as reductions in size and weight. A small portable device about the size of a calculator is available for under $200.

This historical background has well established the 5 level Baudot code as the standard for communications among these devices. The recent explosion of home computers and the increasing number of ASCII terminals in home and business, however, has been a confusing phenomenon. Many owners of ASCII equipment are interested in opening the communication channel with their deaf counterparts and some of the deaf users are interested in participating in many of the services available to ASCII users.

The following comparison attempts to show the glaring differences between the modes and show that the conversion is not a simple process but requires a concerted software and hardware effort. Often, the 8 level ASCII user has a microcomputer with more flexibility and in most cases can easily accomplish this conversion so that he can communicate in the deaf world using the deaf standards. Conversely, many deaf users who have tasted the speed of 300 baud operation using the 8 level standards will soon be looking for dual 5/8 level capability.

To meet this need, the Amateur Radio Research and Development Corporation, a ham radio and hobby computer organization in the Washington D.C. area is actively involved in this field of deaf communications. AMRAD is working on interfaces to the popular home computers to allow 5 level Baudot communications in addition to the 8 level ASCII capability. They have established a computer message system called HEX, for Handicapped Educational and Communication Exchange, on 301-593-7033 to disseminate information about the project and to encourage communications among interested parties.

DIFFERENCES BETWEEN 8-LEVEL ASCII AND 5-LEVEL BAUDOT USING BELL 103 AND WEITBRECHT MODEMS

There are several distinct differences between protocols used for the transmission of 8 level ASCII signals and 5 level Baudot signals over standard telephone lines. The following table attempts to clarify these differences in corresponding fashion. Some of the features are obvious while some of the differences have more subtle ramifications.

FEATURE	ASCII DATA COMMUNICATIONS	DEAF TDD COMMUNICATIONS
CODE	ASCII	Baudot
SPEED	110/300 baud	45.45 baud
MODE	full/half-duplex	2 way simplex
MODEM	Bell 103 ORIG/ANS	Weitbrecht
MARK	ORIG 1270 Hz ANS 2225 Hz	1400 Hz
SPACE	ORIG 1070 Hz ANS 2025 Hz	1800 Hz

In the Weitbrecht modem, tones are only transmitted for the duration of the character so that the line is available for transmission in either direction during pauses between words or characters. In practice the mark tone is retained for as much as a half second before being squelched. This tone provides continuity while continuous characters are being transmitted.

Notice also that the mark is high for the Bell 103 and is the low tone for the Weitbrecht. The only significance is when attempting to convert a Bell 103 modem to Weitbrecht tones, the data will be inverted from normal RS-232 and the mark hold circuitry will need to be inverted.

Another aspect is in line supervision. In the Bell 103 protocol, the presence of the tone carriers gives positive indication of the status of each end of the link. In the Weitbrecht case, however, the absence of tones except while characters are being transmitted results in there being no positive way to test the status of the other end of the communications link.. To aid the deaf, a visual lamp is provided on most Weitbrecht modems which varies in intensity proportional to signals on the line so that the ringing and busy signals are recognizable.

A WEITBRECHT MODEM CONVERSION
FOR THE VADIC 81046 ORIGINATE MODEM

Robert E. Bruninga
USS Blueridge LCC-19
Fleet Post Office
San Francisco, Ca. 96628

The following is a simplified modem conversion to make the readily available VADIC 81046 modem into a Weitbrecht compatible modem for use by the deaf. The Weitbrecht modem uses the 1400 and 1800 Hz tone pair for signalling with the 5 level Baudot code. The conversion described here changes the frequency from the ORIGINATE mode to the Weitbrecht mode, but results in the data being inverted relative to normal RS-232 at the input and output. The reason for this is that in the ORIGINATE mode, the higher frequency is the MARK tone wheras in the Weitbrecht modem, the low frequency is the MARK tone. Also the circuit to squelch the mark tone after one-half second must be added externally to the modem as shown in figure 1.

What follows is a table of the ORIGINATE and TDD values of components. Notice that the first 2 entries can be changed out-right; but that the last 5 values must be tweaked with a scope, frequency counter, and a signal generator to assure the resulting conversion will live up to specs. To aid in this process, representative values for these five resistors are shown.

RESISTOR	ORIGINATE	TDD	CONVERSION
C17	0.01	.0047	replace
R43	16.5	7.8	parllel 15 k
R39/R40	11.5	? ?	as required
D9	–	–	remove
R2/R3	430	860	series 430
R7/R8	380	560	series 180
R25/R26	330	510	series 180
R23/R24	400	790	series 390

The R39/R40 combination sets the transmit frequency. To set the frequency, be sure to have pin 18 biased to -12 volts to assure a solid space siganl before adjusting the R39/R40 combination. Once it is set to 1800 then check the mark frequency by biasing pin 18 to plus 5 volts and see if the shift is within about 10 Hz of 1400 Hz. If not, adjust the R43 combination.

The four bandpass stages that need to be adjusted in the receiver require a little more finesse. The first two stages are stagger tuned; one for mark and the other for space. All that is necessary is to tune each stage and the discriminators so that equal minimum levels of audio are required to activate the carrier detector and that the cross over point from mark to space occurrs at roughly 1600 Hz. The first stage can be measured for a peak of 1400 Hz at pin 7 of IC M7. The second stage can not be measured directly, but should be adjusted for an overall peak at 1800 Hz measured at pin 1 of IC M7 after the first stage is peaked at 1400 Hz.

The discriminators, one for MARK and one for SPACE, can be adjusted next by peaking their response for 1400 Hz at pin 7 of M4 and for 1800 Hz at pin 1 of M4. Proceeding in this order, each adjustment is relatively independent. All of these adjustments are made with the signal fed into the modem input of pin 25. The diode D9 which normally clamps the output to mark in the absence of tones must be removed since that would now be space in the Weitbrecht modem. If the output doesnt normally result in a positive signal, bias pin 2 of IC M5A with the highest value resistor that will assure +5 with no signal.

These modems are available from the author for $25 through August 31. After that time they will be available from Terry Fox at 1819 Anderson Rd. Falls Church, Va. 22043. When he runs out, both ORIGINATE and ANSWER modems are available from VADIC at $85 each in quantities 1 to 50 or $80 each in quantities of 100 or more.
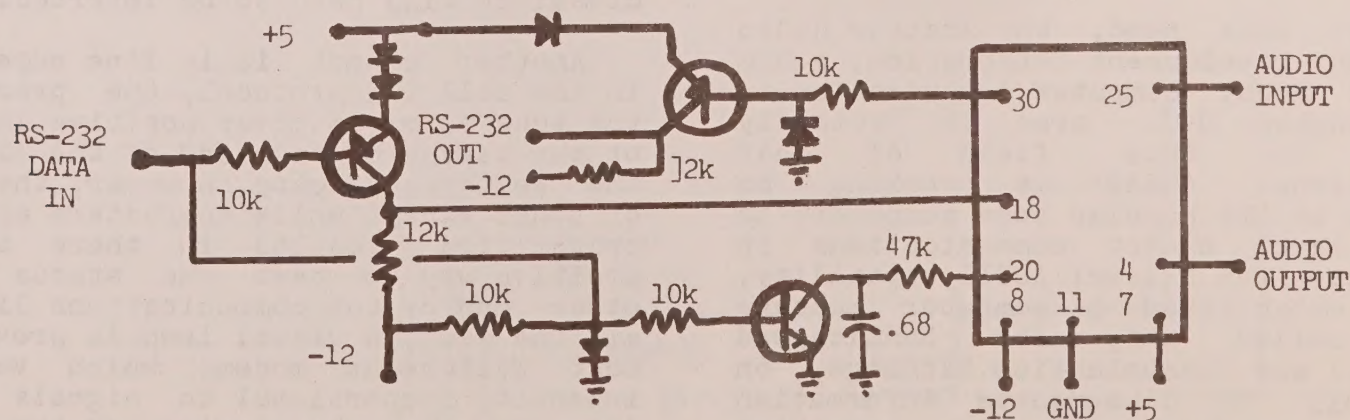

Figure 1. Suitable circuitry for inverting the RS-232 data and driving pin 20.

A COMPUTER PROGRAMMER is being sought for a position in the Northeast part of the USA. Call collect (213) 645-7751, John Moorhead, Vice President of Paul Norsell & Associates, 9841 Airport Blvd Suite 720, Los Angeles, CA 90045.

HAYDEN NEEDS A TRS-80*SPECIALIST who has heavy Z-80 machine language programming experience and an intimate knowledge of TRS-80 hardware, firmware and DOS. Send resume, etc. to: Bill Cook, Editorial Director, Hayden Book Co, Inc., 50 Essex St, Rochelle Park, NJ 07662. *TRS-80 is a trade mark of Tandy Corporation.

TRS-80 MAILGRAM* SOFTWARE has been designed and manufactured by Radio Shack. A Service Agreement with Western Union Electronic Mail Inc. is required to use this software. WUEMI requires an initial set-up charge of $50. Message rates from $1.40 to $2.60 depend upon volume and whether or not the customer commits to $50 monthly minimum or no minimum. For more info write: Western Union Electronic Mail, Inc., P.O. Box 185, McLean, VA 22102. *Mailgram is a trade mark of The Western Union Telegraph Company.

THE MICROCOMMUNICATOR is a set of programs which transforms the Apple II* computer into a communications device for the severely physically disabled. It requires 48k of memory and a single disk drive. In one mode, a single keystroke by finger or mouthstick displays 1 of 60 programmed sentences which can be changed. In another, messages up to 100 words & phrases can be constructed for display or printout by 2 keystrokes, selected from a vocabulary of 1,600. The Microcommunicator Disc and a duplicate backup disc with magnetic and paper documentation is available for $39.00 from Grover & Associates, Creekside Center Suite D 116, 7 Mount Lassen Dr, San Rafael, CA 94903. Indicate Version A for adult level, C for children's vocabulary. *Apple II is a trademark of Apple Computer, Inc.

AN EAST ASIA COMPUTER & ELECTRONICS TOUR is being organized by Commerce Tours Int'l, Inc., 870 Market St Suite 744, San Francisco, CA 94102; (415) 433-3072. Tour #1, $1,003, includes R/T air ticket from SFO and LAX, 5 nights (double occupancy) at the Sunshine Prince Hotel where the World Computer Congress will be held Oct 6-9. It includes a visit to the International Information Processing Exhibition in Tokyo. Tour #2 includes the above but for $2,283 adds: Korea Electronics Show in Seoul Oct 10-12, Japan Electronics Show in Tokyo Oct 14-16, Taiwan Electronics Show in Taipei Oct 17-19, and Hong Kong Electronics Oct 20-22. Optional tours are available to Singapore and Manila.

OPTIMIZED DATA SYSTEMS, Box 595, Placentia, CA 92670, is hawking an OSCAR Program with Map, Az, El and Range for PET owners. Price is $24.95.

IS YOUR COMPUTER LEAKING? You may be interested in electrically conductive coatings manufacured by PennDixon for spraying inside plastic enclosures. For an information packet on EC Coatings for RFI, write: Frederick A. Moller, VP/General Manager, PennDixon, PO Box 188, Sharon Hill, PA 19079; 215-622-3700.

THE GEORGE WASHINGTON UNIVERSITY School of Engineering & Applied Sciences, Washington, DC 20052 announces:

Wideband Communications Systems	Oct 27-29
Data Communications Systems and Networks	Oct 27-31
Protocols for Packet Switching	Nov 24-25
Packet Switching Networks for Modern Data Communications	Dec 8-10
Synchronization in Spread Spectrum Systems	Dec 8-10
Vulnerability of Spread Spectrum Communication Systems	Dec 15-17

SEE THE BOILER PLATE on the reverse page for new AMRAD Message System and HEX numbers as well as new librarian.

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THE AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION is a technically oriented club of about 300 radio and computer amateurs. It is incorporated in the Commonwealth of Virginia and is recognized by the Internal Revenue Service as a tax-exempt scientific and educational organization.

THE PURPOSES OF THE CLUB are to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize forums and technical symposiums; collect and disseminate technical information; and, provide experimental repeaters.

MEETINGS ARE ON 1st MONDAY of each month at 7:30 p.m. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA. If the 1st Monday is a holiday, an alternate date will be announced in the AMRAD Newsletter. Except for the annual meeting in December, meetings are normally reserved for technical talks - not business.

THE WD4IWG/R REPEATER is an open repeater for data communications (including RTTY), voice and experimental modes. It is located at Tyson's Corner, McLean, VA and has excellent coverage. It features a semi-private autopatch available to licensed members. Frequencies are: 147.81 MHz input, 147.21 MHz output. The head of the technical committee is Jeff Brennan, WB4WLW, 7817 Bristow Dr, Annandale, VA 22003, phone 703-354-8541.

THE AMRAD NEWSLETTER is mailed monthly to all members and to other clubs on an exchange basis. Technical articles, new product announcements, news items, calls for papers and other copy related to amateur radio and computing are welcome. Honorariums at a rate of $10 per printed page ($20 maximum per author per issue) are paid for original material accepted. Classified ads are free to members. Commercial ad inquiries are invited. The editor reserves the right to reject or edit any portions of the copy. Items should be mailed by the 8th of the preceeding month to Paul L. Rinaldo, W4RI, Editor, 1524 Springvale Ave, McLean, VA 22101; phone 703-356-8918. Full permission for reprinting or quoting items appearing in the AMRAD Newsletter is granted provided that credit is given. Mailing is by 3rd Class bulk mail to U.S. addresses and 1st Class to Canada and Mexico. Overseas readers add 60¢ for surface or $5.64 for air mail to annual dues.

THE AMRAD MESSAGE SYSTEM is an S-100 Computerized Bulletin Board System on 703-734-1387, system operator Terry Fox, WB4JFI. Terry's home phone number is 703-356-8334. The system accepts 110, 300, 450 and 600 baud ASCII callers using Bell 103-compatible modems.

THE HANDICAPPED EDUCATION EXCHANGE (HEX) is operated by AMRAD for those involved in education and communications for the handicapped. It accepts both 110/300-baud ASCII and deaf TTY callers. on 301-593-7033. The sysop Dick Barth, W3HWN's home phone is 301-681-7372.

THE AMRAD LIBRARY is operated by Tedd Riggs, KA4FYU, 7442 Patterson Rd, Falls Church, VA 22043, 703-821-3172. Donations of technical books, magazines, manuals and catalogs are tax-deductible.

AMRAD IS AFFILIATED with the American Radio Relay League (ARRL), the Foundation for Amateur Radio, the Northern Virginia Radio Council (NOVARC) and The Mid Atlantic Repeater Council (T-MARC).

SPECIAL INTEREST GROUPS are formed from time to time. Currently we have SIG's on Deaf Communications and Spread Spectrum Communications. If you are interested in joining or forming a SIG, please contact Bill Pala, WB4NFB, 5829 Parakeet Dr, Burke, VA 22015; phone 703-323-8345.

TRAINING CLASSES are run as needed. Please discuss your training requirements with any Director.